

CLAIMS

What is claimed is:

1. A leveling device consisting of:
 - (a) a housing having a base portion, a top portion, and a substantially hollow portion, the hollow portion adapted and configured to provide at least one load-bearing surface;
 - (b) an elevation shaft having a longitudinal axis disposed at least partially within the hollow portion, at least a portion of the shaft having threads on its external surface;
 - (c) a worm gear having teeth disposed within the housing, at least one end of the worm gear having an extension protruding out from the housing and configured to facilitate rotation of the worm gear;
 - (d) a driven gear disposed within the hollow portion having internal threads engaged with the threads of the elevation shaft and external gear teeth engaged with the teeth of the worm gear, the driven gear adapted and configured to operably engage the at least one load-bearing surface without any separate bearings;
 - (e) means for retaining the driven gear within the hollow portion; and
 - (f) means for restraining the elevation shaft from rotating relative to the housing,whereby upon rotation of the worm gear in opposite directions and concomitant rotations of the driven gear, the elevation shaft is caused to move axially up or down to provide leveling motions to an object attached to the device.
2. The leveling device of claim 1 wherein the driven gear is a spur gear.
3. The leveling device of claim 1 wherein the driven gear has a stem with a longitudinal centerline.
4. The leveling device of claim 1 wherein the driven gear is a helical gear.
5. The leveling device of claim 1 wherein the means for retaining the driven gear within the substantially hollow portion is a collar fastened within an opening in the base portion.

6. The leveling device of claim 1 wherein the means for retaining the driven gear within the hollow portion is a load-bearing block fastened within an opening in the base portion, the block having a hole configured and adapted to receive the elevation shaft.

5 7. The leveling device of claim 1 wherein the elevation shaft is axially movable to completely retract at least one end of the shaft into the housing.

8. The leveling device of claim 1 wherein the extension of the at least one end of the worm gear protruding out from the housing is configured as a hex head.

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9. The leveling device of claim 1 wherein the means for restraining the elevation shaft from rotating relative to the housing comprises an opening disposed in the top portion of the housing through which the elevation shaft extends, the opening having a flat surface, and a flat portion configured on the shaft to operably engage the flat surface in the opening to prevent rotation of the shaft.

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10. The leveling device of claim 1 wherein the means for restraining the elevation shaft from rotating relative to the housing comprises a slot extending along a portion of the longitudinal axis of the elevation shaft, an opening disposed in the top portion of the housing through which the elevation shaft extends, and the opening having a key to operably engage the slot to prevent rotation of the shaft.

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11. The leveling device of claim 1 wherein the means for restraining the elevation shaft from rotating relative to the housing comprises a key extending along a portion of the longitudinal axis of the elevation shaft, an opening disposed in the top portion of the housing through which the elevation shaft extends, and the opening having a slot to operably engage the key to prevent rotation of the shaft.

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12. The leveling device of claim 1 wherein the worm gear is made of plastic.

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13. The leveling device of claim 1 wherein the driven gear is made of plastic.

14. The leveling device of claim 1 wherein the housing is made of plastic.

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15. A device for leveling an object consisting of:

- (a) a housing having a base portion, a top portion, and a substantially hollow portion, the hollow portion adapted and configured to provide at least one load-bearing surface;
- 5 (b) an elevation shaft having a longitudinal axis disposed at least partially within the hollow portion, at least a portion of the shaft having threads on its external surface;
- (c) means connected to one end of the elevation shaft for protecting a nonuniform surface from damage by contact of the end with the nonuniform surface;
- 10 (d) a worm gear having teeth disposed within the housing, at least one end of the worm gear having an extension protruding out from the housing and configured to facilitate rotation of the worm gear;
- 15 (e) a driven gear disposed within the hollow portion having internal threads engaged with the threads of the elevation shaft and external gear teeth engaged with the teeth of the worm gear, the driven gear adapted and configured to operably engage the at least one load-bearing surface without any separate bearings;
- 20 (f) means for retaining the driven gear within the hollow portion; and
- (g) means for restraining the elevation shaft from rotating relative to the housing,

whereby upon rotation of the worm gear in opposite directions and concomitant rotations of the driven gear, the elevation shaft is caused to move axially up or down to provide leveling motions to an object attached to the device.

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16. The leveling device of claim 15 wherein the surface protecting means comprises a pad shaped as a round disk.

30 17. The leveling device of claim 16 wherein the elevation shaft is axially movable such that the pad may be completely retracted into the housing.

18. The leveling device of claim 16 wherein the pad is rotably connected to the end of the elevation shaft to permit independent relative rotation between the pad and the shaft.

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19. The leveling device of claim 16 wherein the pad is movably attached to the end of the elevation shaft to permit the pad to tilt at an angle relative to a plane perpendicular to the longitudinal axis of the elevation shaft.

5 20. The leveling device of claim 19 wherein the angle ranges from 0 to about 5 degrees.

 21. The leveling device of claim 15 wherein the surface protecting means comprises a roller.
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 22. The leveling device of claim 21 wherein the roller is pivotally mounted to the end of the elevation shaft to permit swiveling of the roller around the elevation shaft.

 23. A device for leveling an object comprising:
15 (a) a housing adapted and configured to attach to the object, the housing having a base portion, a top portion, and a substantially hollow portion, the top portion being situated opposite the base portion, each such portion having at least one opening, the hollow portion having a first internal compartment with a first cross-sectional area parallel to the base portion and a second internal compartment with a second cross-sectional area parallel to the base portion, the second cross-sectional area being smaller than the first cross-sectional area, the first internal compartment communicating with the second internal compartment and the at least one opening in the base portion, the
20 second internal compartment communicating with the at least one opening in the top portion, and a stepped transition between the first internal compartment and the second internal compartment adapted and configured to define at least one load-bearing surface;
25 (b) an elevation shaft having a longitudinal axis disposed at least partially within the hollow portion, at least a portion of the shaft having threads on its external surface;
30 (c) a worm gear having teeth disposed within the housing, at least one end of the worm gear having an extension protruding out from the housing and configured to receive a tool to facilitate rotation of the worm gear;
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- 5 (e) a driven gear disposed in the first internal compartment having internal threads engaged with the threads of the elevation shaft and external gear teeth engaged with the teeth of the worm gear, the driven gear having a top and a bottom wherein the top of the driven gear contacts the load-bearing surface of the stepped transition without any separate bearings;
- 10 (f) a stem having a longitudinal centerline extending from the top of the driven gear and being disposed in the second internal compartment, the stem having a passageway oriented through its longitudinal centerline configured and adapted to receive the elevation shaft;
- (g) means for retaining the driven gear within the hollow portion; and
- (h) means for restraining the elevation shaft from rotating relative to the housing,
- 15 whereby upon rotation of the worm gear in opposite directions and concomitant rotations of the driven gear, the elevation shaft is caused to move axially up or down to impart leveling motions to the object.

24. A method for leveling an object comprising:

- 20 (a) providing at least two leveling devices each comprising:
a housing having a base portion, a top portion, and a substantially hollow portion;
an elevation shaft having a longitudinal axis disposed at least partially within the hollow portion, at least a portion of the shaft having threads on its external surface;
- 25 a worm gear having teeth disposed within the housing, at least one end of the worm gear having an extension protruding out from the housing and configured to receive a tool to facilitate rotation of the worm gear;
- 30 a driven gear disposed within the hollow portion having internal threads engaged with the threads of the elevation shaft and external gear teeth engaged with the teeth of the worm gear;
means for retaining the driven gear within the hollow portion; and
means for restraining the elevation shaft from rotating relative to the housing,
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- whereby upon rotation of the worm gear in opposite directions and concomitant rotations of the driven gear, the elevation shaft is caused to move axially up or down;
- 5 (b) providing a tool configured to operably engage the at least one end of the worm gear extending out from the housing;
- (c) providing an object to which the at least two leveling devices are mounted, the object providing access for the tool to engage the at least two leveling devices;
- 10 (d) engaging the tool with the extension of the at least one end of the worm gear protruding out from the housing of one of the at least two leveling devices; and
- (e) rotating the worm gear of one of the at least two leveling devices with the tool to raise or lower the object.
- 15 25. The method of claim 24 wherein the object is an appliance.
26. The method of claim 24 wherein the object is leveled by rotation of the worm gear of at least one of the leveling devices.
- 20 27. The method of claim 24 wherein the object is leveled by rotation of both worm gears of the at least two leveling devices.
28. A housing for a leveling device comprising:
- 25 (a) a base portion having an opening;
- (b) a top portion having an opening; and
- (c) a hollow portion between the top and base portions, the hollow portion defining a gear cavity having a first cross-sectional area parallel to the base portion, the gear cavity communicating with the opening in the base portion, the hollow portion further defining a gear stem cavity having a second cross-sectional area parallel to the base portion and which is smaller than the cross-sectional area of the gear cavity, the gear stem cavity communicating with and disposed above the gear cavity, the gear stem cavity communicating with the opening in the top portion wherein the gear cavity is coaxially aligned with the gear stem cavity and a stepped transition is formed between the gear cavity and
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the gear stem cavity, the stepped transition providing a load-bearing surface.

5 29. The housing of claim 28 further comprising a substantially rectangular worm gear cavity communicating with the gear cavity, the worm gear cavity having an open top, a closed bottom, two elongated sides, and two ends with an opening disposed in each end.

10 30. The housing of claim 29 wherein the shape of the closed bottom is semi-circular.

31. The housing of claim 29 wherein the housing is fabricated by machining.

32. The housing of claim 29 wherein the housing is plastic.

15 33. The housing of claim 32 wherein the housing is fabricated by molding.

34. A device for leveling an object comprising:

- 20 (a) a housing having a base portion and a top portion and including a substantially hollow portion, the top portion situated opposite the base portion, and the top portion and the base portion each having at least one opening, such housing adapted and configured to attach to the object in an inverted position whereby the base portion is oriented upwardly and the top portion is oriented downwardly;
- 25 (b) an elevation shaft having a longitudinal axis disposed at least partially within the hollow portion and extending out the at least one opening in the top portion, at least a portion of the shaft having threads on its external surface;
- 30 (c) a worm gear having teeth disposed within the housing, at least one end of the worm gear having an extension protruding out from the housing and configured to receive a tool to facilitate rotation of the worm gear;
- (e) a driven gear disposed in the hollow portion having internal threads engaged with the threads of the elevation shaft and external gear teeth engaged with the teeth of the worm gear;
- 35 (f) a load-bearing block inserted within the at least one opening in the base portion, the block having a hole configured and adapted to

receive the elevation shaft, thereby providing a load-bearing surface
for support of the load imposed on the leveling device by the object;
and

5 (g) means for restraining the elevation shaft from rotating relative to the
housing,

whereby upon rotation of the worm gear in opposite directions and
concomitant rotations of the driven gear, the elevation shaft is caused to move
axially up or down to impart leveling motions to the object.

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